Studies of the hybrid performance as a function of Voltage

- Purpose
  - To see the effect of different voltages on the hybrids.
  - Specifically looked at how voltage effected current and noise.

- Procedure
  - Performed SASeq tests on a working L2A stuffed hybrid. Used with spreadsheet software SVX4_MS_1.8, and purple card rev. 2.
  - This was done by adjusting the post regulator on the purple card for both DVDD and AVDD.
  - Measurements were taken from 2.3 volts to 2.7 volts, at increments of 0.1 volts
 - A series of 8 tests were planned for each adjusted voltage.

Tests Done

- **Test 1**
  - READ ALL ON
- **Test 2**
  - READ NEIGHBOR ON
- **Test 3**
  - READ ALL ON
  - RTPS ON
- **Test 4**
  - READ NEIGHBOR ON
  - RTPS ON
- **Test 5**
  - CALINJECT ON; MASK: 5
  - READ ALL ON

- **Test 6**
  - CALINJECT ON; MASK: 5
  - READ NEIGHBOR ON
- **Test 7**
  - CALINJECT ON; MASK: 5
  - READ ALL ON
  - RTPS ON
- **Test 8**
  - CALINJECT ON; MASK: 5
  - READ NEIGHBOR ON
  - RTPS ON
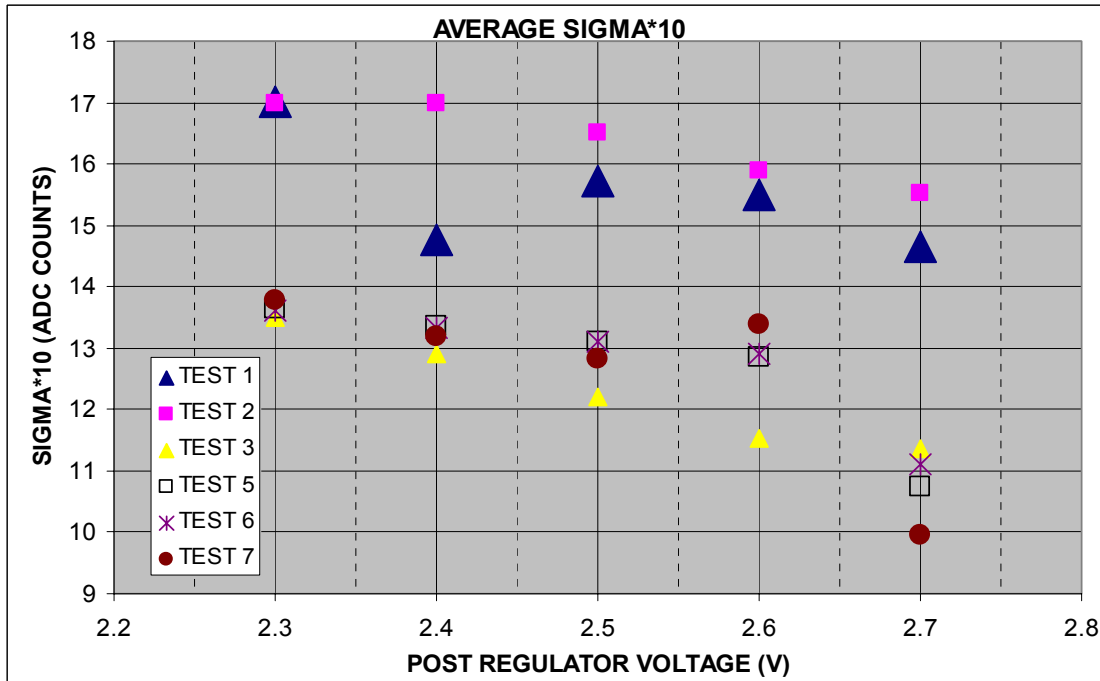- **Couldn't get Test 4 or 8 to work because of spreadsheet failure**

Current as a function of Voltage
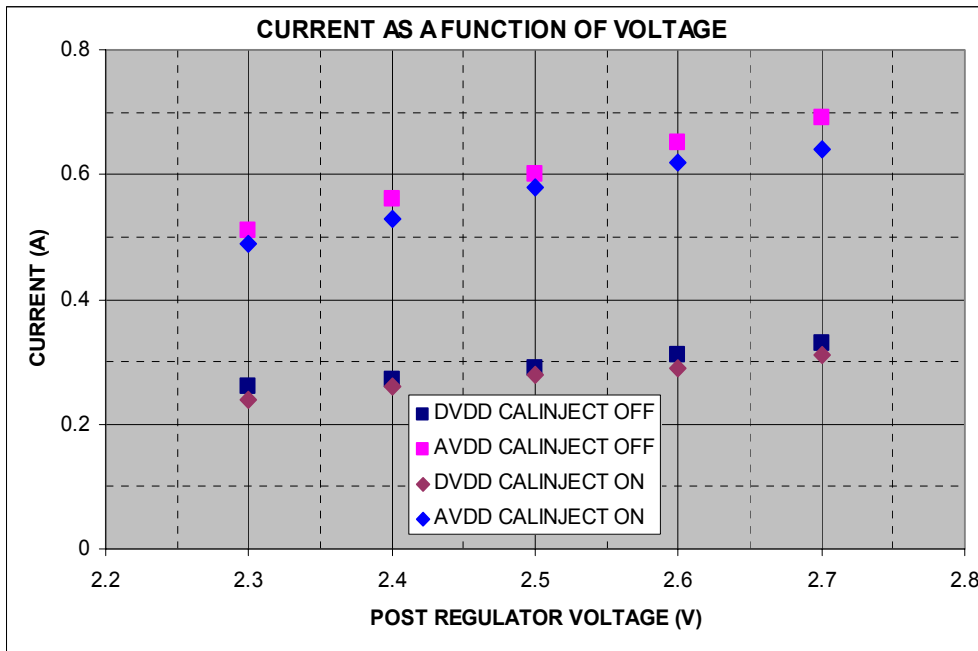
- For both AVDD and DVDD the current increases linearly as voltage increases.
- Was no deviation in current for each test as voltage stayed constant except for CALINJECT
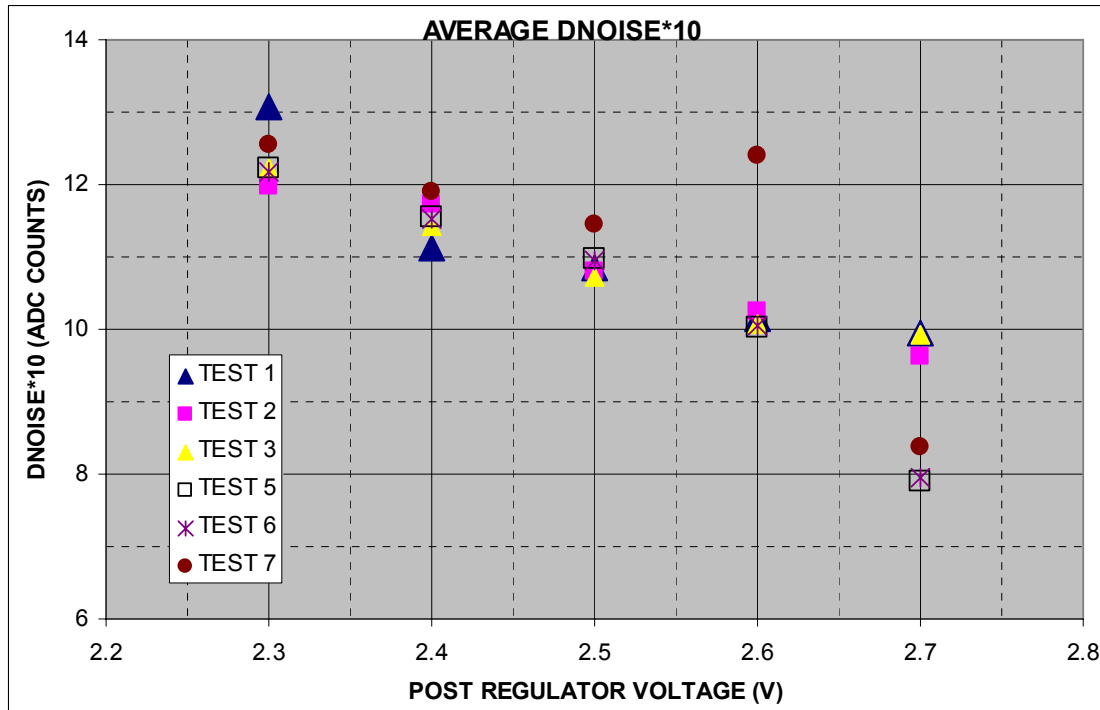
Noise

- Average standard deviation of ADC counts
  - The noise decreases slightly in a linear regression as voltage increases
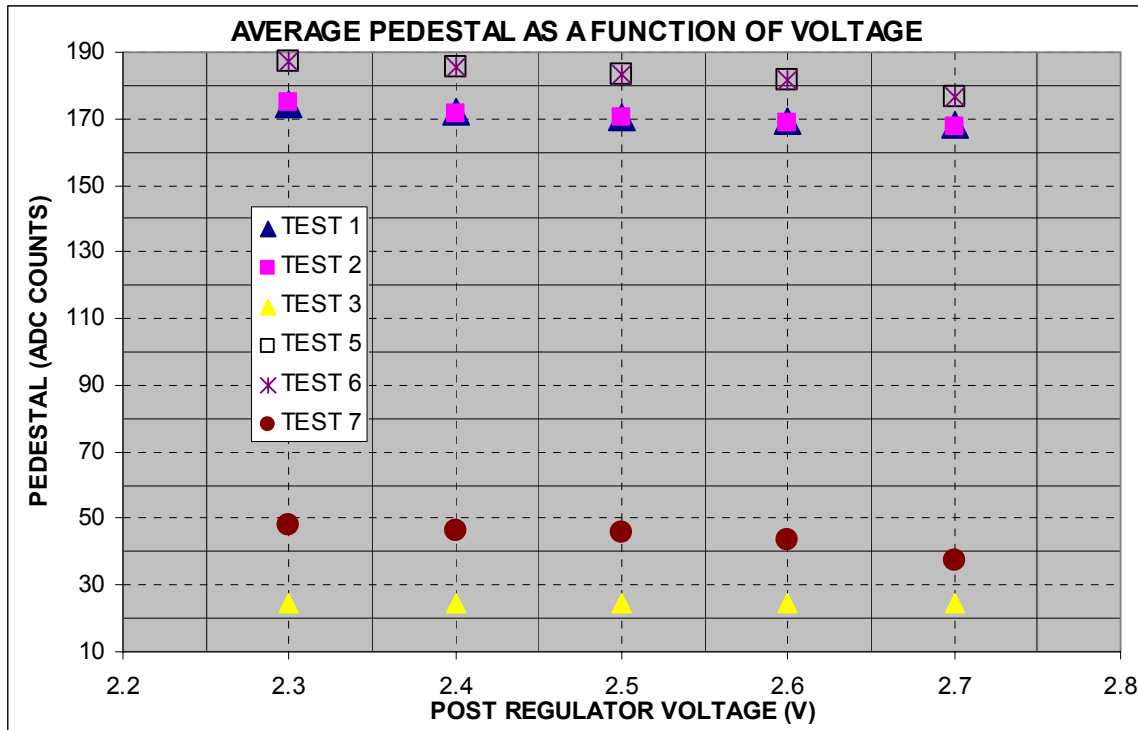
Dnoise as a function of Voltage

- Average DNOISE as a function of voltage.
  - Decreases as voltage increases

Average Pedestal

AVERAGE PEDESTAL AS A FUNCTION OF VOLTAGE

- Average pedestal as a function of voltage
  - ADC counts remain fairly linear as voltage increases
- When taking standard deviation for three graphs at one voltage, error bars were too small to show up on graph.
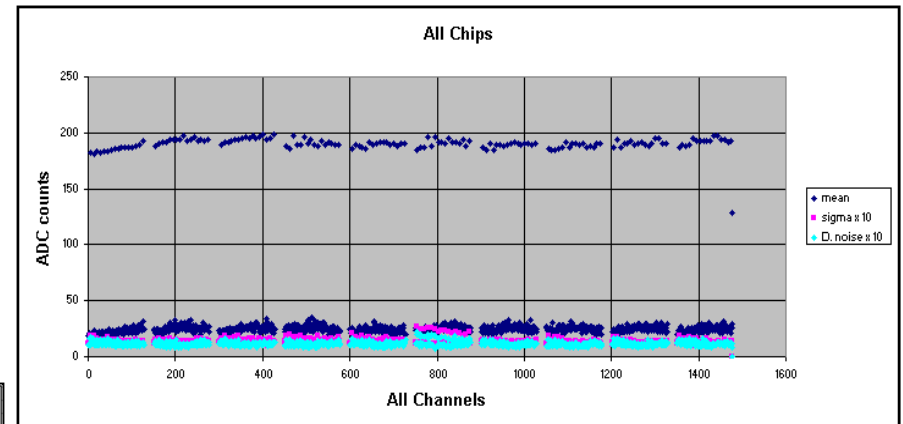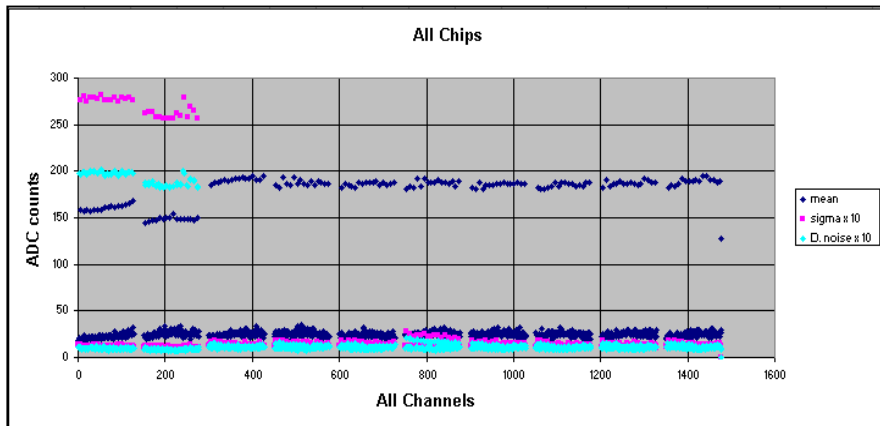
Problems at maximum voltage

- When running at 2.6 volts with CALINJECT ON, READ ALL ON, and RTPS ON, experienced a significant change in noise.
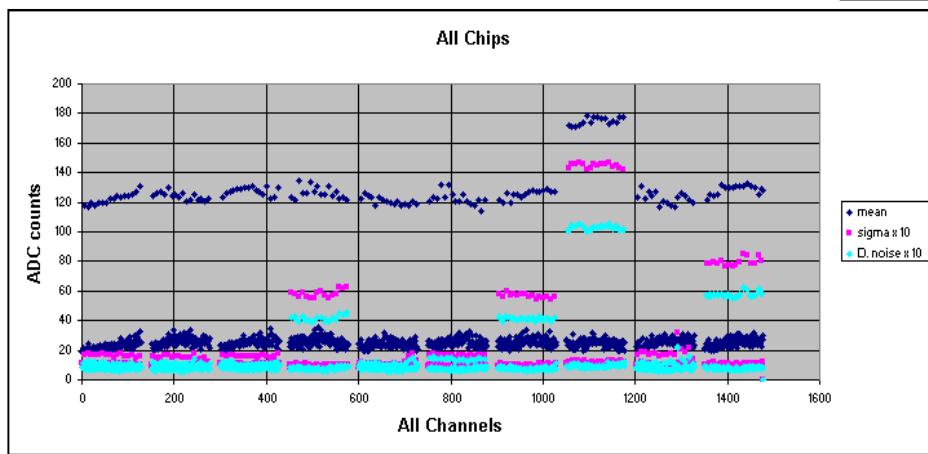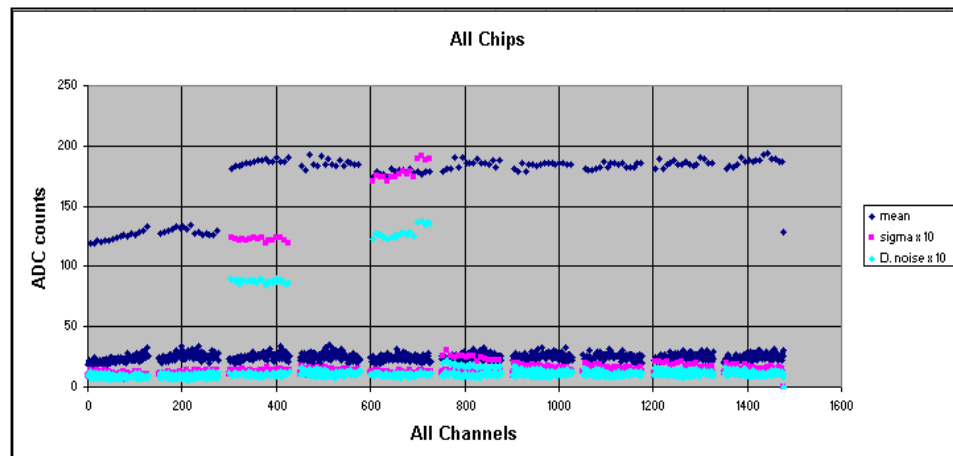
2.525 volts: normal

2.575 volts
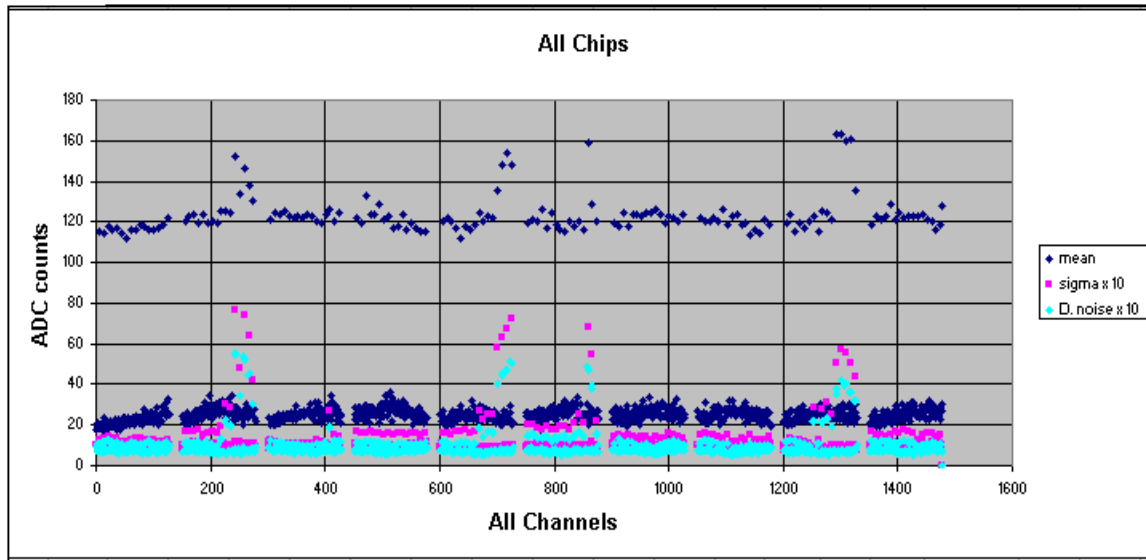
CALINJECT ON, READ
ALL ON, and RTPS ON

2.60 volts

2.65 volts

Problems at Maximum Voltage (3)

CALINJECT ON, READ ALL ON, and RTPS ON

2.70 volts: stays in this pattern for increasing voltages past 2.70 volts

- These tests were ran several times at each voltage and the pattern was similar

- Shows that after you hit 2.525 volts the pedestal starts to break down.

    - Break down happens first in earlier chips, and then as voltage increases the pedestal breaks down in the later chips

To Do and Conclusions

- Follow Ups
  - Need to test RTPS and READ NEIGHBOR ON.
  - We only tested one working stuffed Hybrid. Need to test others to make sure that results are repeatable.
  - Look into why there is an increase in noise as voltage climbs above 2.525 V
  - Find out the bottom range of voltage
- Conclusions
  - As the voltage increases the current also increases
  - The deviation in noise decreases as voltage increases
  - Voltage shouldn't go over 2.525 volts